

Dynamic Models in Reliability and Survival Analysis: Probabilistic Properties and Statistical Inference

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Dynamic models arise in the study of coherent systems in reliability and in failure time models in survival analysis because of the need to account for interventions that are performed, changes in the effective structure of the system due to component failures, load re-distribution among the remaining functioning components as others fail, changing values of time-dependent covariates, and repairs that are undertaken as time progresses. Dynamic models are conveniently formulated in terms of hazard rates or intensity functions, thus leading to so-called hazard-based models. In this talk, I will review dynamic models that have been proposed in both the reliability and survival analysis areas, discuss some of the resulting stochastic properties of the models, and describe inference methods for such models, such as estimation, hypothesis testing, goodness-of-fit testing, and model validation and diagnostics. In particular, I will focus on load-sharing models, repairable system models, and a general and flexible model for recurrent events which subsumes many existing models.

Portions of this talk will be based on research undertaken with Z. Agustin, M. Hollander, P. Kvam, E. Slate, and R. Strawderman.